











RESEARCH ARTICLE

Using mobile audiometry (Wulira App) to assess noise induced hearing loss among industrial workers in Kampala, Uganda: A cross-sectional study

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Abstract

Background

Occupational noise is a common cause of hearing loss in low-income countries. Unfortunately, screening for hearing loss is rarely done due to technical and logistical challenges associated with pure tone audiometry. *Wulira* app is a valid and potentially cost-effective alternative to pure tone audiometry in screening for occupational hearing loss. We aimed to determine the prevalence of occupational hearing loss among workers in a metal industry company in Kampala district.

Methodology

We recruited 354 participants conveniently from a steel and iron manufacturing industry in Kampala. All eligible participants answered a pretested and validated questionnaire and were assessed for noise induced hearing loss in a quiet office room approximately 500 meters from the heavy machinery area using the *Wulira* app. Descriptive statistics such as proportions were used to describe the study population while inferential statistics were used to determine associations.

Results

Of the 354 participants sampled, 333 (94.1%) were male, and the median age was 27, IQR (25–30). Regarding the risk factors of hearing loss, fourteen (3.9%) had history of smoking and more than half (65.5%) had worked in the industry for more than 2 years. The overall

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prevalence of hearing loss among industrial workers was 11.3% (40/354). 16.2% and 9% had mild hearing loss in the right and left ear respectively. Bilateral audiometric notch was present where fourteen (4%) of the participants had notch in their right ear while seven (2%) had notch in their left ear. Residing outside Kampala district was associated with hearing loss (OR, 95% CI, 0.213 (0.063–0.725), $p = 0.013$).

Conclusion

One in 10 workers in a metal manufacturing industry in Kampala had occupational hearing loss. Industrial workers residing outside Kampala were likely to develop hearing loss. Periodic screening should be done for early detection and intervention to prevent progression of hearing loss in this population.

Introduction

The World Health Organisation (WHO) reports that close to half a billion people suffer from disabling hearing loss which is expected to rise to 630 million by 2030 [1]. This is partly due to the increased level of mechanisation in industries resulting into the production of harmful excessive harmful noise [2] which has predisposed industrial workers to sensorineural hearing loss [3, 4]. As a result of the industrial revolution [4], Occupational Hearing Loss (OHL) is increasing becoming a serious public health problem in Sub-Saharan Africa (SSA). Epidemiological studies have shown that the prevalence of OHL ranges between 17% and 48% [3, 5–8]. In Uganda, over 11% of the working population has hearing difficulty, and nearly one out of four cases of OHL are caused by several exposures which include noise, fumes, and heat [3, 4, 9–12]. This presents a significant hindrance to Uganda's efforts of achieving middle income status and the third United Nations Sustainable Development Goal (SDGs) which is to achieve good health and wellbeing.

In Uganda, metal manufacturing industries contribute significantly to the economy of the country through provision of employment and payment of taxes [13–15]. However, studies have reported that metal manufacturing industries produce high noise levels ranging from 90.5–105 dB (A) which is above the recommended noise level 75 to 85 dB (A) [9, 16–20] increasing the risk of developing OHL among the workers [21]. OHL ranks among the leading causes of occupational illness among industrial workers [3, 6] and is responsible for 46 million years lived with disability (YLD) [22]. It has devastating effects on industrial workers such as social isolation, impaired communication with co-workers and family, decreased ability to monitor the work environments, increased injuries, lost productivity, anxiety [23, 24], and an increased risk of cardiovascular diseases/ hypertension [25, 26]. The absence of hearing protection devices in these industries [17] further exacerbate the risk.

To reduce the risk of OHL, early detection and prevention is critical in addressing this occupational hazard. To differentiate age related hearing loss from OHL, the use of audiometric notch has been proposed [27]. This can be used to make a diagnosis of OHL [28] and identify genetic risk to hearing loss [29]. Much as the Occupational and Health safety Act 2006 requires employers to provide periodic screening for OHL for workers in environments that expose them to harmful noise, majority of the employers have failed to implement this law. This is because Pure Tone Audiometry (PTA), which is the gold standard for hearing loss screening, is quite costly, requires a specialist audiologist to operate in a sound-proof room and is not readily available at health sites in Sub-Saharan Africa.

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